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## BIOGRAPHY.

### PROFESSOR WILLIAM CHAUVENET.

BY F. P. MATZ, M. SC., PH. D., NEW WINDSOR, MARYLAND.

“Professor William Chauvenet ranks among the *coryphæi* of science in America. He and Professor Benjamin Peirce have done more for the advancement of mathematical and astronomical science, and for the *raising to a higher level* of the instruction in these subjects, than any other two Americans. It is our wish, on that account, to place before the reader a somewhat full sketch of the life and works of Professor William Chauvenet.”

“William Marc Chauvenet, the father of the subject of this sketch, was born at Narbonne, France, in 1790, and came to the United States in 1816. He was the youngest of four brothers, another of whom also came to this country, but has left no descendants. William Marc was a man of education and culture, versed in several languages, and a constant reader. He came to America, however, in connection with a manufacturing enterprise which had its headquarters in New York, with a branch at Boston. The latter department was under Mr. Chauvenet's charge, and here he married, in 1819, Miss Mary B. Kerr, of Roxbury, Mass. This was prior to the occurrence of a heavy defalcation in the New York house, which broke up the enterprise so badly that all investments in it proved to be total losses. Mr. Chauvenet having an idea that rural life would suit his taste, bought a small farm close to *Milford, Pike County, Pennsylvania*, and it was here that his only child, WILLIAM CHAUVENET, was born, May 24, 1820.

By the advice of friends Mr. Chauvenet soon gave up his attempt at farming, and settled in Philadelphia, where his son grew to manhood. His rapid progress at school attracted such attention from his instructors, especially

in mathematics, that his father easily yielded to their advice, and sent him to Yale College, where he graduated in 1840, '*facile princeps*' in mathematics, and *high in standing* in all other branches. The honorary societies, 'Phi Delta Kappa' and 'Chi Delta Theta,' denoting respectively the fifteen of highest standing and the fifteen best writers of the class, each claimed him as a member.

Upon his return to his home he was, after a brief incumbency in a subordinate position, appointed professor of mathematics in the Navy. Late in 1841 he married Miss Catherine Hemple, of Philadelphia. Shortly after this he served a brief term on a United States vessel, as instructor to midshipmen, but did not go upon a foreign cruise, and was soon detailed to the 'Naval Asylum,' then situated at Philadelphia. Here midshipmen were sent at that time, to receive instruction and examinations, principally in mathematics and the theory of navigation. The young professor was struck with the imperfections in the education of naval officers, and it was very largely through his efforts, aided by such influences as he could bring to bear on the matter, that a commission was appointed to *draft a plan* for a fixed 'Naval Academy,' corresponding to the Military Academy at West Point. Six naval officers constituted this commission, Professor Chauvenet being one of the number. The appointment of so young a man (he was but twenty four at the time) on a commission of such importance indicates what must have been his record, and the impression he made upon his seniors in years and rank.

The Naval Academy was formally called into existence in the year 1845, being located at Annapolis, Md. Professor Chauvenet was appointed to the chair of mathematics, and resided at the academy until his resignation from the Navy in 1859.

It was not long after this change of residence that he began to plan his work on trigonometry, which was published in 1859. Its title, 'A Treatise on Plane and Spherical Trigonometry,' partly indicated that it was not a students' class-book merely, but that it took up most of the more advanced applications of the subject. It soon assumed the position it still retains as the standard reference work in its line.

Some time before this publication, Professor Chauvenet had persuaded his father to retire from business and accept a position at the academy. He came as instructor in the French language, and remained at his post until his death in 1855.

It having been decided to erect an astronomical observatory at the academy, Professor Chauvenet was made professor of astronomy and put in charge of the observatory. As he became more and more interested in his work, the idea of his next treatise, 'Spherical and Practical Astronomy,' grew upon him, and, just previous to his resignation, had assumed such form that he issued a prospectus for its publication as a subscription work. This was never carried out.

In 1859 he was notified that his application for the professorship of mathematics at Yale College would be followed by his election to that position.

Almost simultaneously with this came a call to St. Louis, Mo., where

he was offered the same chair in the then newly established Washington University. After much deliberation he accepted the latter, and removed with his family (including at that time his mother) to St. Louis, in the fall of 1859.

Chancellor Hoyt, who was at the head of the 'Washington' at this time, died early in the 'sixties,' and Professor Chauvenet was elected to the vacancy. He still continued his duties as professor of mathematics, and also *resumed* his work on the 'Astronomy.' The risks of publication were great, and his means did not enable him to guarantee the publishers against loss. The Civil War was in progress, and the time seemed inopportune for such an undertaking. It was to the liberality of certain friends, chiefly to the initiative of Mr. (afterward Judge) Thomas T. Gantt, of the St. Louis bar, that a guarantee fund was raised, sufficient in the opinion of the publishers to prevent any loss to them. The work, in two octavo volumes, was published in 1863.

Few works of a scientific nature, by American authors, have been received with such universal favor, by those competent to judge of its merits, as was this. Its reputation was quite as great in Europe as here, while of course it is not (as it was never intended to be) a treatise much known outside of scientific, and more especially *astronomical*, circles. Its scope, and the rigorous methods adopted, are sufficiently indicated in the author's preface. It retains to-day its standard character, as fully as when this was first recognized by the scientific world upon its publication.

Professor Chauvenet's mother died in St. Louis, not long after the appearance of the *Astronomy*, and it was but a few months later that the first symptoms of the disease that proved finally fatal to him, made their appearance. Partial recovery and resumption of his duties was followed by a long period of alternating hopes and fears, during which time he tried in vain different parts of the United States, from South Carolina to Minnesota. During this illness he worked at his *only* elementary publication, the 'Geometry,' which he undertook, partly because he had long thought that the popular texts of the day were marked by too strict an adherence to strictly 'Euclidian' methods, and partly because he wished to provide an income for his family, by the publication of a text for which he had reason to suppose there would be a larger sale than was possible with advanced treatises. The publication of this work shortly *antedated* his death, which occurred at St. Paul, Minn., December 13, 1870.

Professor Chauvenet left, so to speak, two distinct impressions behind him. By far the larger circle, in numbers, of those who knew him, were of those to whom his scientific attainments, though known, were as traditions merely, since they were in a field whose extent was to them only a matter of vague conjecture. To these he left the impression of a man of wide and varied culture, and keen critical taste. Probably few scientists of distinction were more keenly interested in lines outside of their own specialties. He was not only a *critic* in music, but to his latest day a *pianist* of no mean ability, always expressing a preference, in his own playing, for the works of Beethoven, which he rendered with an interpretation which never failed to excite the admiration of musicians whose execution surpassed his own. His knowledge of English

literature was extensive, but he read and re-read a few authors, at least in the latter part of his life, and his great familiarity with many of these gave point to the old adage, 'fear the man of few books,' though perhaps not in the sense in which these words were originally intended. He was a ready writer, and contributed at times, reviews, partly scientific, to various journals. His style was clear and unaffected, while, in the review of a pretentious or ignorant author, he had the gift of a delicate sarcasm, so light at times as only to be visible to one reading between the lines. For other pretenders he could drop this mask, and write with severity; but only twice in his life, to the knowledge of the present writer, did he ever do so. In addition to his more important writings, he was the author of a 'Lunar Method,' still used in the Navy, and invented a device called the 'great circle protractor,' by which the navigator is enabled (knowing his position) to lay down his course on a 'great circle' of the globe, without further calculation. This invention was purchased by the United States Government not long after the close of the Civil War.

Professor Chauvenet's scientific reputation needs little comment on the part of the present writer. He was one of a group of scientists in his own or cognate lines, who were the first to secure recognition abroad, as well as at home, for the position of the exact sciences in the United States. Among his more intimate scientific friends were Benjamin Peirce and Wolcott Gibbs (Harvard), Dr. B. A. Gould, and many others whose names are as household words in the history of scientific progress in this country. At the *formation* of the National Academy of Sciences he was one of the prominent members. But while his scientific reputation will outlast his personal memory, it is doubtful if to those who knew him, even of his scientific associates, it will ever be as present as his strong personal attractiveness, the result at once of an easy and varied culture, and of a simple dignity of character, which impressed alike his family, his friends, and his pupils. His family consisted, at the time of his death, of his wife, four sons, and a daughter."

"The only mathematical book written by Chauvenet and not mentioned in the above sketch is a little book entitled 'Binomial Theorem and Logarithms,' published in 1843 for the use of midshipmen at the Naval School, Philadelphia:"

As regards the quality of Professor Chauvenet's books, Prof. T. H. Safford, of Williams College, says: "This excellent man and lucid writer was admirably adapted to promote mathematical study in this country. His father, a Frenchman of much culture, trained him very thoroughly in the knowledge of the French language, even in its niceties. They habitually corresponded in that language; and the son was enabled to study the mathematical writings of his ancestral country in a way which enabled him to reproduce in English their ease and grace of style, as well as their matter. In these respects his works are far more attractive than those of ordinary English writers; his Trigonometry is much the best work on the subject which I know of in any language; his Spherical and Practical Astronomy is frequently quoted by eminent *continental* astronomers; and his Geometry has raised the standard of our ordinary textbooks, of which it is by far the best existing."

Professor Chauvenet's books, especially his Geometry and Trigonometry, have been used in the best of American schools. Recently Professor Byerly, of Harvard University, brought out an *excellent* revised edition of the Geometry. In their originality, the works of Professor Chauvenet are admirably rigorous. The methods of investigation adopted in his Astronomy are in accordance with what may be called the modern school of practical astronomy—or more distinctly, the *German* school—at the head of which stands the unrivalled BESSEL. His Trigonometry and Astronomy are the first *American* works to introduce the consideration of *the general spherical triangle*, or that in which the six parts of the triangle are not subjected to the condition that they shall each be less than  $180^\circ$ , but may have any values less than  $360^\circ$ . Also, all ambiguity as to the species of the six parts of the triangle is removed by determining the parts, when necessary, by *two* of their trigonometric functions, usually the *sine* and the *cosine*. In adopting this admirable feature—mainly due to *Gauss*, Professor Chauvenet was years in advance of the English and *other* American astronomers. A *new* and *simple* demonstration of the formula for the prediction of the transits of the inferior planets over the sun's disc, he gives; while *Lagrange's* well-known formula in this connection, he renders *more accurate* by his introduction of a consideration with respect to the compression of the earth. Taking the fundamental formulæ of Bessel's theory of eclipses, he deduces new and elegant solutions—and these *quite as exact* as the Besselian ones. In so far as the distinctive treatment of the *occultations of planets* by the moon, is concerned, Professor Chauvenet stands as the illustrious pioneer. His Trigonometry is still *the* book in the United States Naval Academy; and last session we had a special class from Annapolis, making up Naval Academy shortcomings in Chauvenet's Plane and Spherical Trigonometry. In that mountainous county of Pike, in that wilderness-county of north-eastern Pennsylvania, in that venatorial elysium and piscatorial paradise of 'The Keystone State,' Professor William Chauvenet was born—think of it, readers of the MONTHLY. We acknowledge our indebtedness to *President* Regis Chauvenet, Colorado School of Mines, and to *Professor* Florian Cajori, of Colorado College, for material used in this biographical sketch.

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